US 20180238794A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2018/0238794 A1**

KANGAS et al. (43) **Pub. Date: Aug. 23, 2018**

(54) **REFERENCE SWITCH ARCHITECTURES FOR NONCONTACT SENSING OF SUBSTANCES**

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(21) Appl. No.: **15/751,095**

(22) PCT Filed: **Aug. 29, 2016**

(86) PCT No.: **PCT/US2016/049330**

§ 371 (c)(1),
(2) Date: **Feb. 7, 2018**

Related U.S. Application Data

(60) Provisional application No. 62/213,004, filed on Sep. 1, 2015.

Publication Classification

(51) **Int. Cl.**

G01N 21/27	(2006.01)
G01J 3/02	(2006.01)
G01J 3/32	(2006.01)
G01J 3/36	(2006.01)
G01J 3/433	(2006.01)
G01J 3/447	(2006.01)
G01N 21/47	(2006.01)
G01N 21/35	(2006.01)

(52) **U.S. Cl.**

CPC ***G01N 21/276*** (2013.01); ***G01J 3/0286*** (2013.01); ***G01J 3/32*** (2013.01); ***G01J 3/36*** (2013.01); ***G01J 3/433*** (2013.01); *G01N 2201/0221* (2013.01); ***G01N 21/474*** (2013.01); ***G01N 21/4785*** (2013.01); ***G01N 21/35*** (2013.01); *G01N 2021/4709* (2013.01); ***G01J 3/447*** (2013.01)

(57) **ABSTRACT**

This relates to systems and methods for measuring a concentration and type of substance in a sample at a sampling interface. The systems can include a light source, optics, one or more modulators, a reference, a detector, and a controller. The systems and methods disclosed can be capable of accounting for drift originating from the light source, one or more optics, and the detector by sharing one or more components between different measurement light paths. Additionally, the systems can be capable of differentiating between different types of drift and eliminating erroneous measurements due to stray light with the placement of one or more modulators between the light source and the sample or reference. Furthermore, the systems can be capable of detecting the substance along various locations and depths within the sample by mapping a detector pixel and a microoptics to the location and depth in the sample.